

Effect of Total Extract of Milk Thistle Fruits on the Absorption of Glycine in the Rats Small Intestine under Physiological Conditions

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Due to environmental pollution, changes occur in the metabolism of the human body, and its adaptive regulatory mechanisms. The small intestine, in which the final stages of digestion and the formation of monogenic nutrients take place, is a barrier between the environment and the internal environment of the body and therefore it is sensitive to the presence of various pollutants that can both penetrate the enteral barrier and disrupt the intestinal epithelium. Thus the existence of the whole organism to a certain extent depends on the functional activity of small intestine. Recently, for the correction of metabolic disorders in humans often use herbal remedies that are gentle action and mild side effects on the background of a broad therapeutic range. The natural complex of biologically active substances - milk thistle - more than 2 thousand years uses to treat a range of diseases - from influenza and arthritis to prostate carcinoma and breast cancer. The most famous it is as a hepatoprotector: on the basis of its main active ingredient - silymarin-Carsyl, Hepabene, Legalon, Galstena and other mono- and multicomponent hepatoprotective drugs were created.

Hepatoprotective effect of silymarin consists primarily in the repair of the hepatocyte membrane, stimulation of protein synthesis by the activation of r-RNA synthesis and changes in the qualitative composition of the membranes by increasing the amount of phospholipids and fatty acids. Considering membranotropic properties of silymarin we can expect a similar effect on the enterocytes. Therefore the idea to explore the effect of the total extract of milk thistle containing both water- and lipid-soluble active ingredients, on the functional activity of small intestine appears. Earlier in the experiments in vitro we investigated the effect of the total extract of milk thistle on glycine transport into the accumulating mucosal preparations. When however, data from different methodological conditions vary considerably, not only in absolute terms, but also in direction, so the purpose of the work was to study the effect of the total extract of milk thistle on the absorption of glycine in the small intestine under physiological conditions in the absence of the effect of anesthesia and surgical trauma.

We have developed an original technique for the formation of a functioning fragment of the small intestine directly included in the digestive system and preserving innervation, blood supply and passage of chime. HDt allows to explore the functional activity of the small intestine in chronic experiments on non-anaesthetized animals in the absence of surgical trauma and stress - i.e., under physiological conditions. Previously, using this technique, we determined the dynamics of absorption of neutral non-essential amino acids - glycine. The aim of this paper was to study the effect of the total extract of milk thistle *Silybum Marianum* (G.) on this process.

Lipid solubility and molecular size are the major limiting factors for molecules to pass the biological membrane to be absorbed systematically following oral or topical administration. Several plant extracts and phytoconstituents, despite having excellent bio-activity in vitro demonstrate less or no in vivo actions due to their poor lipid solubility or improper molecular size or both, resulting poor absorption and poor bioavailability. It is often found that, when individual constituents are isolated from the plant extract there is loss of specific bio-activity. Sometimes some constituents of the multi-constituent plant extract are destroyed in gastric environment when taken orally. Phytosomes are advanced forms of herbal formulations that are better absorbed, and as a result produce better bioavailability and actions than the conventional herbal extracts. They are produced by a patented process whereby the standardized plant extract or its constituents are bound to phospholipids, mainly phosphatidylcholine, producing a lipid compatible molecular complex. This phyto-phospholipid complex (phytosome) resembles a little cell. Phytosomes exhibit better pharmacokinetic and pharmacodynamic profile than conventional herbal extracts. Phytosome technology has been effectively used to enhance the bioavailability of many popular herbal extracts including milk thistle, Ginkgo biloba, grape seed, green tea, hawthorn, ginseng etc and can be developed for various therapeutic uses or dietary supplements.

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